

REMARKS

Claims 1-6 and 13-17 are all the claims presently pending in the application.

Applicant gratefully acknowledges that **claim 3** would be **allowable** if rewritten in independent form and amended to obviate the objection thereto. While Applicant believes that all of the claims are patentable over the cited references, to expedite prosecution, Applicant rewrites allowable claim 3 in independent form. Thus, claim 3 should now be allowed.

However, Applicant respectfully submits that all of the claims (i.e., claims 1-6 and 13-17) are allowable, for the reasons set forth below.

While Applicants believe that all of the claims are patentable over the prior art of record, to expedite prosecution, independent claim 1 and dependent claims 4 and 5 are amended to define more clearly and particularly the features of the present invention. Claims 7-12 are canceled without prejudice or disclaimer. New claims 13-17 are added to define more clearly and particularly the features of the invention, and to claim additional features of the invention. No new matter is added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 4-6 and 9-12 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

Claim 6 stands rejected under 35 U.S.C. § 112, first paragraph.

Claims 1, 4, 6-8, 10, and 12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Shinkai (U.S. Patent No. 4,540,915).

Claims 1, 4, 6-8, 10, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shinkai.

Claims 1, 2, 4, 5, and 7-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yamazaki (U.S. Patent No. 5,755,998).

Claims 1, 2, 4, 5, and 7-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki.

Claims 1, 2, 4, 5, and 7-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Otsuka (U.S. Patent No. 5,635,109).

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

Conventional light emitting devices allow the wavelength conversion of light emitted from a light emitting element by a phosphor material to obtain a desired emission color. In such conventional light emitting devices, the phosphor material in phosphor layer is excited by ultraviolet light emitted from the light emitting element and, thereby, it radiates, e.g., white light.

However, in the conventional light emitting devices the phosphor layer is exposed, and therefore, the phosphor material may be subjected to degradation due to absorbed moisture. On the other hand, if an air-tight housing is employed to prevent the penetration of water into the cover, the manufacturing cost will rise since the light emitting device becomes difficult to assemble. Thus, in conventional devices, it is

difficult to sufficiently prevent moisture from causing degradation the phosphor material (e.g., see specification at page 1, lines 15-29, and page 2, lines 1-14).

Also, in the conventional devices, it is difficult to make the thickness of phosphor layer equal. Thus, it is difficult to generate equal fluorescence over the entire cover in conventional devices (e.g., see specification at page 2, lines 15-20).

The claimed invention, on the other hand, provides a light emitting device in which the degradation of phosphor material due to moisture can be prevented, and equal fluorescence also can be obtained over its entire emission surface (e.g., see specification at page 2, lines 23-28).

According to the claimed invention, the phosphor glass comprises a basic glass component doped with a fluorescence activation element (e.g., see specification at page 6, lines 3-7). It is noted that the present application defines “*phosphor glass*” such that the “*fluorescence activation element*” is included as a glass component (e.g., see page 6, lines 3-4). That is, the “*fluorescence activation element*” is not merely mixed into the glass.

For example, independent claim 1 exemplarily defines a light emitting device, including a light emitting element and a phosphor layer that is composed of phosphor glass to generate fluorescence while being excited by light emitted from the light emitting element. The light emitting element emits ultraviolet light, and the phosphor glass generates visible fluorescence while being excited by the ultraviolet light. The phosphor glass includes a low-melting phosphor glass doped with a fluorescence activation element.

On the other hand, independent claim 8 exemplarily defines a light emitting device, including a light emitting element, an optical system that converges light emitted from the light emitting element, wherein the optical system is composed of phosphor

glass, and the phosphor glass comprises a low-melting phosphor glass doped with a fluorescence activation element.

According to the claimed invention, since the fluorescence activation element is incorporated into the glass structure, it can be stabilized to moisture (e.g., see specification at page 7, lines 11-13). Thus, the claimed invention can provide a light emitting device in which the degradation of phosphor material due to moisture can be prevented, and equal fluorescence also can be obtained over its entire emission surface (e.g., see specification at page 2, lines 23-28).

That is, in a light emitting device according to the exemplary aspects of the claimed invention, ultraviolet light emitted from the light emitting element can excite a phosphor element in the cover to generate fluorescence. According to the exemplarily aspects of the claimed invention, the phosphor element can be evenly doped in phosphor glass to form the cover. Thus, the fluorescence can be generated evenly and, therefore, unevenness in emission color can be prevented. Moreover, since the phosphor element is part of the glass material, the phosphor element is prevented from being subjected to degradation due to moisture. Thus, the light emitting device according to the exemplary aspects of the claimed invention can provide excellent endurance (e.g., see specification at page 13, lines 10-18).

II. REJECTIONS UNDER 35 U.S.C. § 112

A. Claims 4-6 and 9-12 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

With respect to claim 4-6, Applicant respectfully traverses the Examiner's rejection.

With respect to claim 4, line 3, i.e., the phosphor glass being “particle-shaped”, the Examiner alleges that it remains unclear what “the phosphor glass comprises particle-shaped phosphor glass” means even in light of the specification.

The Examiner acknowledges that the specification at page 7, lines 23-24 discloses that the phosphor glass may be contained in the phosphor layer while being ground into particles or powder, “meaning that the phosphor layer (i.e., phosphor glass layer) contains phosphor glass particles dispersed in it, not the phosphor glass dispersed particles” (see Office Action at page 2, numbered paragraph 2).

The Examiner also asserts that the phosphor particles are very tiny, whereas the phosphor glass is a larger sized particle item that has a definite shape (such as planar or curved etc.).

As an aside, Applicant notes that page 3, line 5, of the Office Action appears to have a typographical error. That is, “claim 3” at page 3, line 5, properly should recite “claim 6”, which is the claim being discussed in this rejection.

First, Applicant respectfully notes that the specification does not state that “phosphor glass” includes only larger sized particle items having a definite shape (such as planar or curved etc.). Thus, the Examiner improperly is reading limitations into the claims, and indeed, into the specification itself.

However, notwithstanding the above, and while Applicant believes that claim 4 is clear and definite as it is currently written, to expedite prosecution, claim 4 is amended to overcome this rejection.

Thus, the Examiner is requested to reconsider and withdraw the rejection of claims 4-6.

With respect to claims 9-12, it is noted that claims 1 and 8, from which claims 9-12 depend, respectively, do not recite “*fluorophosphate glass*”. Thus, the Examiner’s position is not understood. Accordingly, these claims would be clear and definite. However, it is noted that claims 9-12 have been canceled without prejudice or disclaimer, and therefore, the rejection of these claims has been rendered moot.

Notwithstanding the above, Applicant notes that new claim 16 recites “*fluorophosphate glass*”. Again, since claim 1, from which new claim 16 depends, does not recite “*fluorophosphate glass*”, Applicant submits that new claim 16 is clear and definite.

B. Claim 6 stands rejected under 35 U.S.C. § 112, first paragraph, as allegedly being not enabled. Applicant respectfully disagrees, and therefore, traverses this rejection.

Applicants submit that the ordinary skilled artisan could certainly make and use the claimed invention after a thorough reading of the specification with reference to the drawings, and therefore, respectfully traverses this rejection.

In the present Office Action, the Examiner alleges that claim 6 is not enabled because the term “other than” as recited in claim 6, refers to any material, which allegedly is beyond the scope of the disclosed phosphor material of the phosphor glass.

As a preliminary matter, Applicant submits that it is unclear whether the Examiner is rejecting claim 6 as being not enabled, or failing to comply with the written description requirement, of 35 U.S.C. § 112, first paragraph. That is, the Examiner states that the claim is not enabled, but appears to assert that the specification does not literally disclose phosphor material other than phosphor glass.

Notwithstanding the above, Applicant submits that claim 6 clearly complies with both the written description requirement and the enablement requirement of 35 U.S.C. § 112, first paragraph.

It is noted that Applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention (e.g., see M.P.E.P. § 2163, *citing* Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (fed. Cir. 1997). Moreover, while there is no *in haec verba* requirements, newly added claim limitations must be supported in the specification through express, implicit, or inherent disclosure.

Contrary to the Examiner's assertion, the specification of the present application describes a "phosphor material" numerous times throughout the specification. That is, the specification does not limit the disclosure only to "phosphor glass" (e.g., see specification at page 1, lines 17 and 27-29; page 2, lines 1-20; page

Thus, claim 6 clearly complies with the written description requirement.

Moreover, claim 6 clearly complies with the enablement requirement.

Applicant notes that, as ample case law has held, the test for enablement is whether one of ordinary skill in the art could practice (e.g., make and use) the invention (e.g., the claimed invention), without undue experimentation.

Applicant respectfully submits that a *prima facie* case has not been established by the Examiner. That is, the Examiner has not established the specific reasons why one of ordinary skill in the art could not make a phosphor layer including "*a phosphor material other than the phosphor glass*", as recited in claim 6, without undue experimentation.

The Examiner should identify what information is missing and why one skilled in the art

could not supply the missing information without undue experimentation (e.g., see M.P.E.P. § 2164.04 and § 2164.06(a)).

Secondly, even assuming that a *prima facie* case was made that one of ordinary skill taking the present invention as a whole would not have been able to make and use “a *phosphor material other than the phosphor glass*”, as recited in claim 6, without undue experimentation, to overcome a *prima facie* case of lack of enablement, Applicant must demonstrate by argument and/or evidence that the disclosure, as filed, would have enabled the claimed invention for one skilled in the art at the time of filing (see M.P.E.P. § 2164.05).

Applicant notes that the specification clearly describes that the “phosphor glass” is composed such that an element having fluorescence activity, such as a rare-earth element, is doped into a basic glass component, such as fluorophosphate.

Further, the specification clearly discloses that a “second phosphor material may be further combined that can be excited by fluorescence light (a) generated from the phosphor glass and/or phosphor material and can generate fluorescence light (b) with a wavelength different from the fluorescence light (a)” (see specification at page 8, lines 22-26), and that the “particle of phosphor glass and/or phosphor material may be evenly dispersed or locally disposed in the transparent material” (see specification at page 8, lines 22-26).

Moreover, the specification clearly describes examples of phosphors, including: ZnS:Cu, Al; (Zn, Cd)S:Cu, Al; ZnS:Cu, Au, Al; Y₂SiO₅:Tb; (Zn, Cd)S:Cu; Gd₂O₂S:Tb; Y₂O₂S:Tb; Y₃Al₅O₁₂:Ce; (Zn, Cd)S:Ag; ZnS:Ag, Cu, Ga, Cl; Y₃Al₅O₁₂:Tb; Y₃(Al, Ga)₅O₁₂:Tb; Zn₂SiO₄:Mn; LaPO₄:Ce, Tb; Y₂O₃S:Eu; YVO₄:Eu; ZnS:Mn; Y₂O₃:Eu; ZnS:Ag, ZnS:Ag, Al; (Sr, Ca, Ba, Mg)₁₀(PO₄)₆Cl₂:Eu; Sr₁₀(PO₄)₆Cl₂:Eu; (Ba, Sr,

Eu)(Mg, Mn)Al₁₀O₁₇; (Ba, Eu)MgAl₁₀O₁₇; ZnO:Zn; and Y₂SiO₅:Ce (see specification at page 8, lines 15-21).

Also, Applicant submits that the ordinarily skilled artisan clearly would know and understand the existence of other phosphor materials, other than phosphor glass. It clearly is not necessary, and indeed, would not be reasonable, for Applicant to list each and every phosphor material in the disclosure of the application to comply with the enablement requirement, or for that matter, the written description requirement.

Thus, Applicant clearly has demonstrated by argument and/or evidence that the disclosure, as filed, would have enabled the claimed invention for one skilled in the art at the time of filing (see M.P.E.P. § 2164.05).

In light of the specific examples in the original disclosure, Applicant submits that the ordinarily skilled artisan could certainly make and use the claimed invention after a thorough reading of the specification with reference to the drawings. In other words, one of ordinary skill in the art could practice (e.g., make and use) the invention, without undue experimentation.

Accordingly, Applicant respectfully requests that the Examiner withdraw this rejection

III. THE PRIOR ART REJECTIONS

Claims 1, 4, 6-8, 10, and 12 stand rejected under 35 U.S.C. §102(b) as being anticipated by Shinkai. Claims 1, 4, 6-8, 10, and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shinkai. Claims 1, 2, 4, 5, and 7-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yamazaki. Claims 1, 2, 4, 5, and 7-12

stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki. Claims 1, 2, 4, 5, and 7-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Otsuka.

Applicant respectfully traverses each of the rejections, for at least the following reasons.

As mentioned above, to expedite prosecution, claim 1 is amended to define more clearly the features of the invention.

For example, independent claim 1 recites a light emitting device, including:

*a light emitting element to emit ultraviolet light;
a phosphor layer that includes phosphor glass to
generate fluorescence while being excited by the ultraviolet
light emitted from the light emitting element; and
an optical system to converge the ultraviolet light
emitted from the light emitting element (emphasis added).*

That is, the claimed invention includes an optical system to converge the ultraviolet light emitted from the light emitting element. Thereby, the ultraviolet light (=invisible light) that is emitted can be converged by the optical system to be efficiently irradiated like a spot to a lighted object (e.g., UV-curable material).

Moreover, since the phosphor layer includes phosphor glass, the operator can safely check the turn-on, or turn-off, state of the light emitting device while viewing, in the lateral direction of the device, fluorescence generated by being excited by the ultraviolet light emitted from the light emitting element (e.g., see specification at page 18, lines 3-29).

In comparison, Shinkai, Yamazaki, and Otsuka, either individually or in combination, disclose or suggest the above features of the claimed invention.

That is, neither Shinkai, Yamazaki, and Otsuka, either individually or in combination, discloses or suggests “*a light emitting element to emit ultraviolet light; a*

phosphor layer that includes phosphor glass to generate fluorescence while being excited by the ultraviolet light emitted from the light emitting element; and an optical system to converge the ultraviolet light emitted from the light emitting element”, as recited in independent claim 1.

For the foregoing reasons, independent claim 1 and dependent claims 2-6 and 13-17 clearly are not anticipated, or for that matter, rendered obvious from, Shinkai, Yamazaki, and Otsuka, either individually or in combination.

Therefore, the Examiner is requested to reconsider and withdraw this rejection and to permit these claims to pass to immediate allowance.

IV. NEW CLAIMS

New claims 13-17 are added to provide more varied protection for the present invention, as exemplarily described in the original specification and Figures of the present application.

Applicants submit that claims 13-17 are patentable over the prior art of record for somewhat similar reasons as those set forth above with respect to claims 1-6.

First, Applicant notes that new claim 17 recites somewhat similar features as allowable claim 3, and therefore, is believed to be allowable for the same reasons.

Moreover, with respect to claims 13-16, the prior art of record does not disclose or suggest that the claimed combination of features, as recited in claims 13-16, which define more clearly and particularly the subject matter of the invention. For example, the specification describes the claimed “convex lens” and “reflection mirror” at page 18, lines 5-6 and 23 of the present application.

The prior art of record does not disclose or suggest the combination of features recited in claims 13-17, by virtue of their dependency from claim 1, as well as for the additional combination of features recited therein.

For at least the foregoing reasons, Applicant submits that claims 13-17 are patentable over the prior art of record. Therefore, the Examiner is requested to permit claims 13-17 to pass to immediate allowance.

V. FORMAL MATTERS

Claims 3 and 7 are objected to under 37 C.F.R. § 1.75(c). It is noted that claim 7 has been canceled without prejudice or disclaimer, and therefore, this objection has been rendered moot. Thus, the Examiner is requested to withdraw this objection.

With respect to allowable claim 3, the Examiner asserts that claim 1 recites a phosphor layer in the singular form, and therefore, that dependent claim 3 cannot later define a plurality of layers. Applicant respectfully submits that the Examiner is misunderstanding the meaning of the term “*comprising*”, in claim 1, line 1. That is, since “*comprising*” is an open-ended term, the claim can include the recited features, plus others features (e.g., see M.P.E.P. § 2111.03).

Allowable claim 3 recites that “the phosphor layer includes a plurality of layers”. Applicant notes that the term “includes” also has been held by the Federal Circuit to be an open-ended term. Thus, claim 3 clearly does not contradict claim 1, as alleged by the Examiner.

The Examiner also is requested to acknowledge receipt of and approve the formal drawings filed on June 16, 2004, in the next official Action.

VI. CONCLUSION


In view of the foregoing, Applicants submit that claims 1-6 and 13-17, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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